Spot Safety Project Evaluation

Project Log # 200512173

Spot Safety Project # 10-96-219

Spot Safety Project Evaluation of the Flashing Traffic Signal Installation
At the Intersection of SR 1719 (Marshville-Olive Branch Rd)
And SR 1726 (Old Gold Mine Rd)
Union County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 02/22/2006
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Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 10-96-219 – The Intersection of SR 1719 (Marshville-Olive Branch Rd) and SR 1726 (Old Gold Mine Rd) w/ SR 1725 (Deep Springs Rd), Union County.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis of the treatment data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flashing traffic signal. Due to its proximity to the subject location, the intersection of SR 1725 (Deep Springs Rd) and SR 1719 (Marshville-Olive Branch) was also analyzed. SR 1719, SR 1726, and SR 1725 are all 2-lane facilities with no turn lanes. The speed limit for all roads is 55 mph, with an advisory speed limit of 40 mph for both approaches on SR 1719 (Marhville-Olive Branch). The subject location is a four-leg intersection and is controlled by stop signs on SR 1726, with an oversized stop sign on the western approach. SR 1725 intersects SR 1719 approximately 150 feet northeast of the subject intersection. This is a three-leg intersection controlled by a stop sign on SR 1725.

There is a vertical curve on the southern leg of SR 1719 that restricts site distance for vehicles on SR 1719 and for stopped vehicles looking toward it from SR 1726. In addition there is a gas station in the southeast corner of the intersection located between SR 1726 and SR 1725 that does not have channelization for traffic entering and exiting the store. Because of the lack of channelization vehicles would park in locations that obstructed site distance for vehicles trying to turn out of the southeast leg of SR 1726 and for vehicles turning out of SR 1725. This gas station is no longer in service and is currently abandoned.

There were a total of 7 crashes reported during the initial study from 1/1/1992 to 1/1/1996, 5 angle crashes, and 2 rear-end crashes. The final completion date for the flashing traffic signal installation at the subject intersection was on November 20, 1997 with a total cost of $4,000.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from October 1, 1997 to December 31, 1997. The before period consisted of reported crashes from January 1, 1990 through September 30, 1997 (7 Years 9 Months) and the after period consisted of reported crashes from January 1, 1998 to September 30, 2005 (7 Years 9 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was conducted.

The analysis consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersection of SR 1719 (Marshville-Olive Branch Rd) and SR 1002 (Ansoville Rd). Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	10	6	-40.0
Total Severity Index	3.22	16.1	400.0
Frontal Impact Crashes	8	6	-25.0
Frontal Severity Index	2.85	16.1	464.9
Volume	1600	2000	25.0

Comparison Information

	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	6	4	-33.3
Total Severity Index	16.1	4.7	-70.8
Frontal Impact Crashes	6	3	-50.0
Frontal Severity Index	16.1	5.93	-63.2
Volume	1125	1600	42.2

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-) Percent Increase (+)
Treatment Total Crashes	10	6	-10.0
Comparison Total Crashes	6	4	---
Treatment F.I. Crashes	8	6	50.0
Comparison F.I. Crashes	6	3	---

The naive before and after analysis at the treatment location resulted in a 40.0 percent decrease in Total Crashes, a 25.0 percent decrease in Frontal Impact crashes, and a 25.0 percent increase in Average Daily Traffic (ADT). The comparison location experienced a 33.3 percent decrease in Total Crashes, a 50.0.0 percent decrease in frontal crashes, and a 42.2 percent increase in ADT. The before period ADT year was 1993 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the Comparison are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 10.0 percent decrease in Total Treatment Intersection crashes and a 50.0 percent increase in Frontal Impact crashes.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 40.0 percent decrease in Total Crashes and a 25.0 percent decrease in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 10.0 percent decrease in Total Crashes and a 50.0 percent increase in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in both Total Crashes and Frontal Impact Crashes from the before to the after period. However, when using the Odds Ratio to measure the treatment effect there appears to be an increase in Frontal Impact Crashes.

Referencing the *Collision Diagram*, there was no significant pattern of crashes in the before period. The Left Turn-Different Roadway crashes decreased from 2 to 1 from the before period to the after period, with the 1 after period crash occurring in 1999. As previously stated, the gas station on the corner between SR 1725 and SR 1726 is currently closed. The reduction in these types of crashes could be attributed to the closure of the gas station, however the date of closure is unknown. In addition, there was 1 angle collision in the before period involving a vehicle leaving the gas station. Since there were no reported accidents of this type in the after period, this can also be attributed to the closure of the gas station.

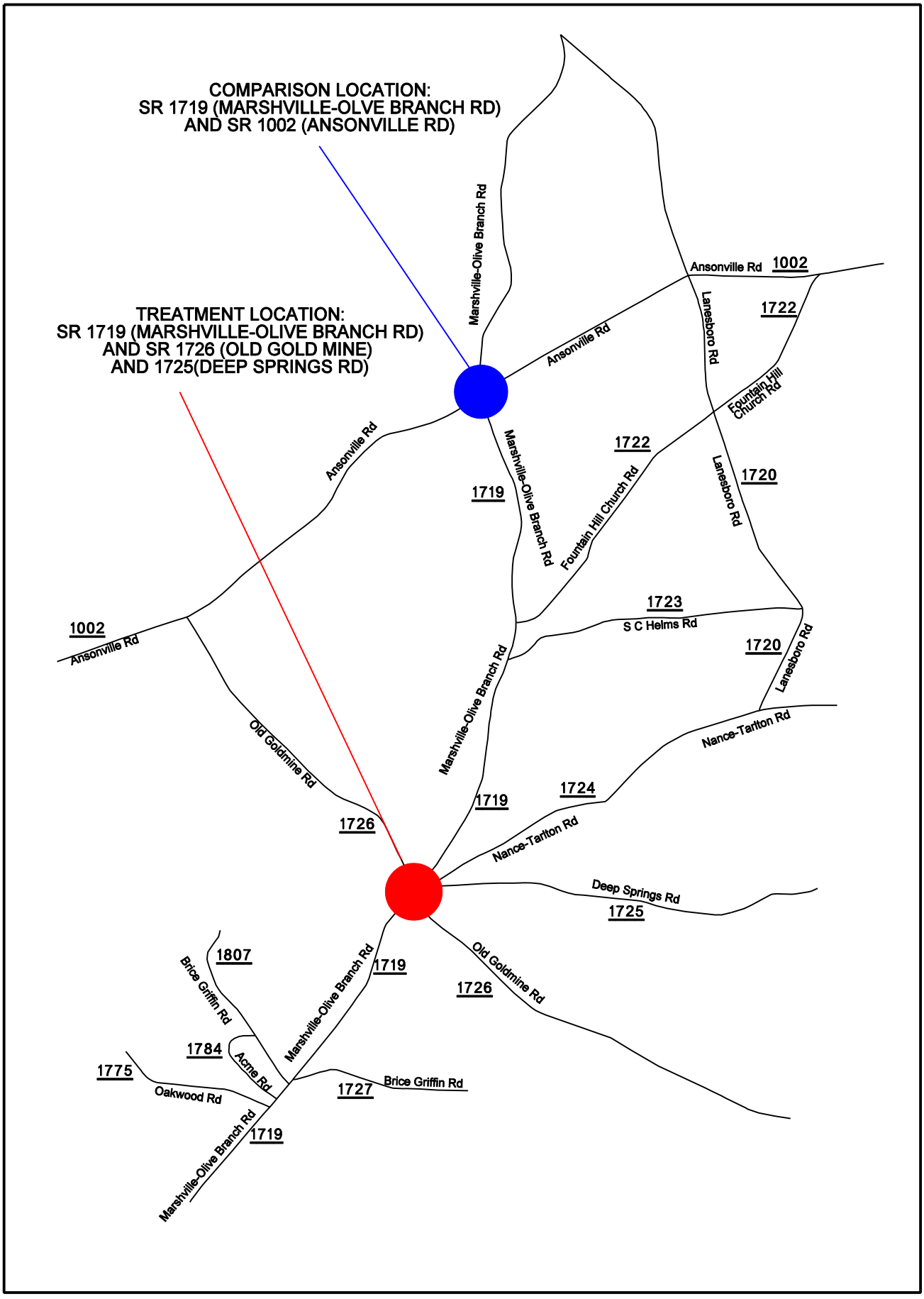
There appears to be a pattern of crashes emerging in the after period involving vehicles traveling from the southeast leg of SR 1726 and vehicles traveling northeast on SR 1719. As previously stated in the *Project Information and Background*, there is a vertical curve on the southwest leg of SR 1719 that restricts site distance for both movements involved in these collisions (*See Treatment Site Photos*. The site distance along with the increase in ADT could be factors causing this emerging crash pattern.

The large increase (400 and 464.9 percent) in the severity indexes from the before to the after period appears to be random due to the nature of crashes and their injury types. The 2 after period crashes that contributed to this increase were both Frontal Impact Crashes involving vehicles either turning left or going straight from westbound SR 1726 colliding with a vehicle traveling north on SR 1719. Neither collision involved excessive speeds or a vehicle running the stop sign. The Left Turn-Different Roadway crash had 2 “A”, 1 “B”, and 2 “C” injuries and the Angle crash had 3 “B” and 1 “C” injury.

Please see the attached *Treatment Site Photos*. Photos are provided for all four legs of the intersection, site distance from the eastern leg of SR 1726 (note the limited site distance looking left), and looking toward the subject intersection of SR 1725.

The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 40 to 10 percent decrease in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of a 25 percent decrease to a 50 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

Location Map
Union County
Evaluation of Spot Safety Project 10-96-219



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TREATMENT SITE PHOTOS TAKEN 2/16/2006

Travelling West on SR 1726 (Old Gold Mine Rd)

Travelling East on SR 1726 (Old Gold Mine Rd)

Travelling North on SR 1719 (Marshville-Olive Branch Rd)

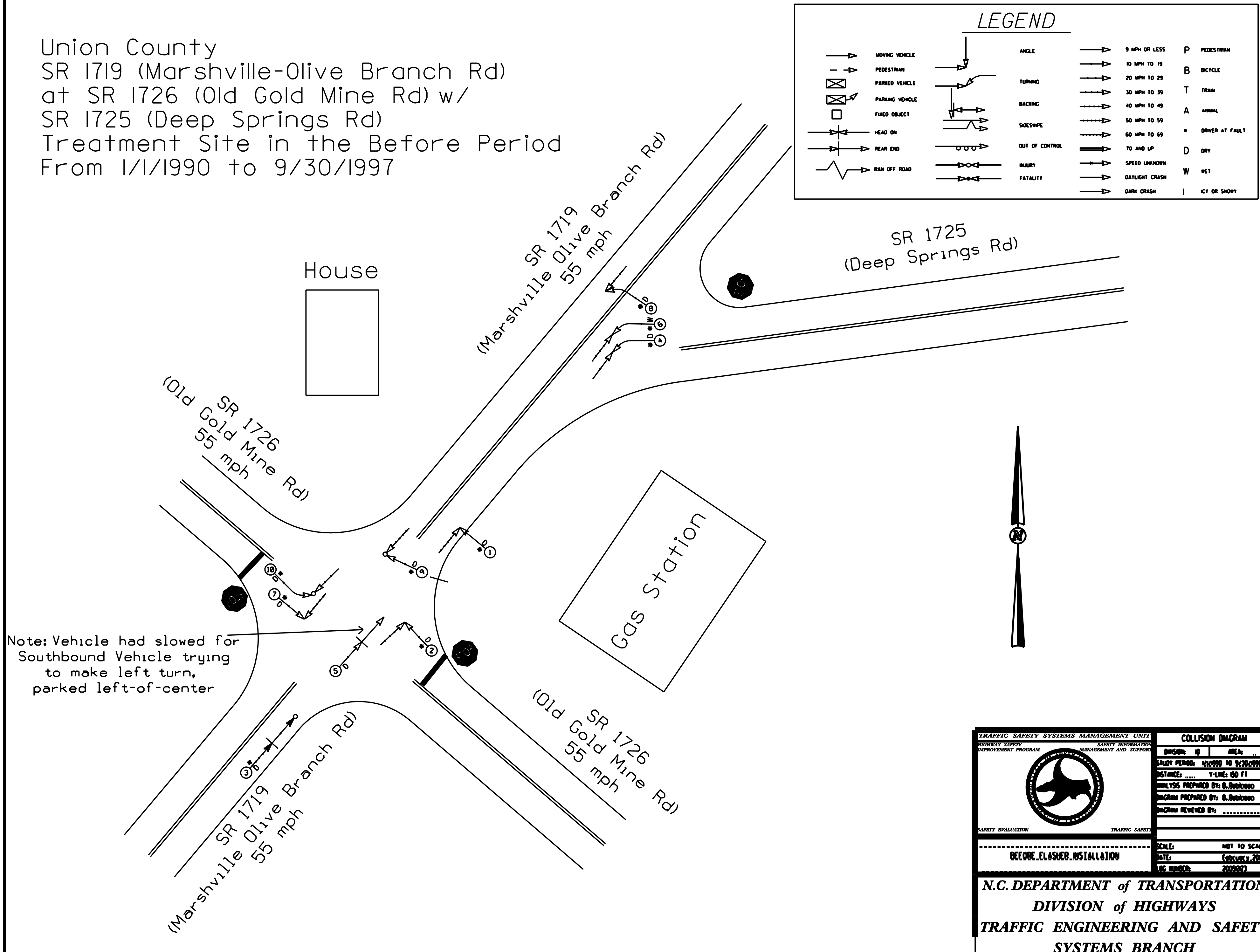
Travelling South On SR 1719 (Marshville-Olive Branch Rd)

On East Leg of SR 1726 (Old Gold Mine Rd), Looking Left

On East leg of SR 1726 (Old Gold Mine Rd), Looking Right

Looking at Subject Intersection from Stop on SR 1725 (Deep Springs Rd)

Union County
SR 1719 (Marshville-Olive Branch Rd) at SR 1726 (Old Gold Mine Rd) w/ SR 1725 (Deep Springs Rd)
Treatment Site in the Before Period From 1/1/1990 to 9/30/1997



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT	COLLISION DIAGRAM
HIGHWAY SAFETY IMPROVEMENT PROGRAM / SAFETY INFORMATION MANAGEMENT AND SUPPORT	DIVISION: 10 AREA: ..
	STUDY PERIOD: 1/1/1990 TO 9/30/1997
	DISTANCE: ...... Y-LINE: 150 FT
	ANALYSIS PREPARED BY: B.Robinson
	DIAGRAM PREPARED BY: B.Robinson
SAFETY EVALUATION / TRAFFIC SAFETY	DIAGRAM REVIEWED BY: ....
BEFORE FLASHER INSTALLATION	SCALE: NOT TO SCALE
	DATE: February 2006
	LOG NUMBER: 2005I2173

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

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Union County
SR 1719 (Marshville-Olive Branch Rd)
at SR 1726 (Old Gold Mine Rd) w/
SR 1725 (Deep Springs Rd)
Treatment Site in the After Period
From 1/1/1998 to 9/30/2005